



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/020,911	12/19/2001	Gilroy J. Vandentop	2207/12665	8839

23838 7590 10/10/2003
KENYON & KENYON
1500 K STREET, N.W., SUITE 700
WASHINGTON, DC 20005

EXAMINER

ZARNEKE, DAVID A

ART UNIT

PAPPR NUMBER

2627

DATE MAILED: 10/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/020,911	VANDENTOP ET AL.	
	Examiner	Art Unit	
	David A. Zarneke	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133)
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 14-16 and 31 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 14-16 and 31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____. | 6) <input type="checkbox"/> Other. |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 8/6/03 have been fully considered but they are not persuasive.

It is argued that there is no motivation to modify Fan to arrive at an electro-optic package because Fan is limited to the electrical advantages of direct copper bonding.

The examiner takes the position that the rejection is being attacked in a piecemeal manner. Fan is relied upon to teach that direct copper bonding is known in the art. The examiner relied upon applicant's admitted prior art to teach that electro-optic packages are known in the art.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Also, seeing as Fan teaches that direct copper bonding is a known in the art method, the optic advantages of using direct copper bonding would be inherent properties.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a

rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection. "There is nothing inconsistent in concurrent rejections for obviousness under 35 U.S.C. 103 and for anticipation under 35 U.S.C. 102." In *re Best*, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977). This same rationale should also apply to product, apparatus, and process claims claimed in terms of function, property or characteristic. Therefore, a 35 U.S.C. 102/103 rejection is appropriate for these types of claims as well as for composition claims (MPEP 2112).

Along the same line of reasoning, as stated in the previous office action, the examiner states that the present invention is merely a new use for a known process, which is unpatentable. Therefore, the taking of the known in the art method of direct copper bonding, and its use in electrical packages, and applying it to *electro-optic* packages is unpatentable.

The use of old process steps employing new materials is unpatentable. In *re Maxwell et al.*, 89 USPQ 387 (CCPA).

Applicant's response also seasonably challenges the examiner's reliance upon "ordinary skill" and requests further evidence supporting this assertion. Further, it is stated that if the examiner is taking official notice, references are requested supporting this position.

The examiner's reliance upon "ordinary skill" is only used in the motivational statement wherein a reason for combining Fan with applicant's admitted prior art is provided. It was not a stand alone statement or a reliance upon official notice. The examiners evidence supporting this assertion is supplied in the section of the

motivational statement after the phrase "ordinary skill", namely that interconnect delays are significantly reduced and system performance is increased, and is further supplied by the examiners assertion that the present invention is merely a new use for a known process. The electrical advantages noted above would be as applicable and noteworthy in electro-optic packages as they are in electrical packages.

Since the examiner's assertions that 1) Fan teaches that interconnect delays are significantly reduced and system performance is increased would be a significant advantage, regardless of its lack of mentioning any optical advantages, and 2) that the present invention is merely a new use for a known process were not challenged and/or are still valid motivational statements, no further evidence is required.

For completeness, the rejections of the claims from in the previous office action are restated below and a rejection of newly added claim 31 is also included.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-4, 14-16 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Fan et al., "Copper Wafer Bonding", Electrochemical and Solid State Letters, 2 (10), pp. 534-536, 1999.

Applicant's admitted prior art teaches a method of fabricating an electro-optic package comprising:

providing an IC wafer having one or more IC contact pads, the IC pads being connected to an IC on the wafer;

providing an intermediate wafer having one or more intermediate contact pads, the intermediate contact pads being connected to an electro-optic arrangement on the intermediate wafer ((0003J)-(0005)).

Applicant's admitted prior art fails to teach direct copper bonding the IC contact pads to adjacent intermediate contact pads, the electro-optic semiconductor package resulting.

Fan teaches the use of direct copper bonding to attach device wafers.

Even though Fan does not teach the connecting one wafer to another wafer having an electro-optic arrangement thereon, it would have been obvious to one of ordinary skill in the art to use the direct copper bonding of Fan in Applicant's admitted prior art because Fan teaches that interconnect delays are significantly reduced and system performance is increased (first paragraph).

As taught by Fan, direct copper bonding is known in the art. Therefore, the present invention is a new use for a known method. Merely finding a new application for a known method is unpatentable.

The use of old process steps employing new materials is unpatentable. In re Maxwell et al., 89 USPQ 387 (CCPA).

Regarding claims 2-4, Fan teaches cleaning the contact pads in an acid bath (claim 3), disposing the IC contact pads adjacent the intermediate contact pads in an oxidation-resistant environment comprising a nitrogen purge (claim 4) having a

predetermined ambient temperature, and forcing the IC contact pads into direct contact with the adjacent intermediate contact pads at a predetermined temperature, resulting in a direct copper bond (under the heading Experimental).

With respect to claim 14, Applicant's admitted prior art teaches a computer processor wafer having one or more contact pads (100031).

As to claim 15, Applicant's admitted prior art teaches providing a chip interposer as the intermediate wafer ((0003)).

Regarding claim 16, Applicant's admitted prior art teaches providing a host wafer as the intermediate wafer (0003)).

With respect to newly added claim 31, the direct copper bonding enabling optical losses associated with the electro-optic semiconductor package to be minimized is an inherent property of direct copper bonding. This property would be inherent to the direct copper bonding of Fan (see MPEP 2112).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

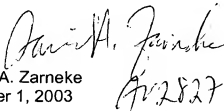
extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Zarneke whose telephone number is (703)-305-3926. The examiner can normally be reached on M-F 10AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703)-308-1233. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-308-6789.

David A. Zarneke
October 1, 2003

Handwritten signature of David A. Zarneke in cursive, with the number 2827 written below it.